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April 24, 1998

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Dear Dr. Goodman:

In order to complete my ONR grant entitled "Mapping Jets and Eddies in an Eastern Boundary Current", I am sending three copies of the *Final Technical Report* to you with copies distributed as indicated below, along with a completed *Report Documentation Page (SF 298).*

Sincerely,

Adriana Huyer

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OSU PI

Enclosures

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FINAL TECHNICAL REPORT
ONR GRANT # N00014-92J1348

Adriana Huyer, P. Michael Kosro, Jack A. Barth, Robert L. Smith
Mapping Jets and Eddies in an Eastern Boundary Current

In the summer of 1993, we made two high-resolution surveys of the California Current using both an Acoustic Doppler Current Profiler and a towed SEASOAR to study the evolving eddy/jet field. Each large survey of the jet/eddy field was followed by more detailed surveys of selected mesoscale features, including an offshore-migrating cyclonic eddy, a counter-rotating eddy pair, and an inshore anticyclonic eddy. Our surveys show clearly that eastern boundary currents are not "broad, weak equatorward flows", but instead are sites of intense interactions between jets, eddies, coastal currents, and the continental margin.

A surface-intensified baroclinic jet was the dominant feature during both large-area surveys. In June this jet was remarkably simple with only one gentle meander at about 38.2 N but by August the jet had developed intense meanders, and part of the jet lay 200 km farther offshore. Cyclonic and anticyclonic eddies were present during both surveys. Anticyclonic eddies often have subsurface cores, with core waters similar to those in the California Undercurrent, and seem to originate along the continental margin.

The ageostrophic component of the currents was estimated from the difference between absolute streamfunctions (calculated from ADCP data) and the dynamic topography (calculated from the Seasoar CTD data). The near-surface ageostrophic flow was westward in the surface layers during both surveys, consistent with wind-driven offshore Ekman transport. Hodographs of the cruise-averaged data show that the ageostrophic component of the near-surface current lay to the right of the wind, and decreased with depth. The penetration depth of the ageostrophic flow was shallower during the cruise with weaker winds.

The dynamics of one cyclonic eddy was examined in detail. Geostrophic velocities in this eddy had maximum speeds of ~50 cm/s, and the overall range of the relative vorticity of was -0.8f to 1.0f, where f is the local Coriolis parameter. At the 100m level, the relative vorticity ranged from -0.2f to 0.5f, and the estimates of the vertical velocity range from -30 to 30 m/day, amounting to net water-parcel displacements over periods of a few days to be ~50m; these are sufficient to move waters into and out of the the euphotic zone, and thus are likely to affect the primary productivity.

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13. ABSTRACT *(Maximum 200 words)*

This report summarizes results of two large-area, high resolution Seasoar/ADCP surveys of the California Current. We conclude that this is a region of intense interactions between jets, eddies, coastal currents and the continental margin.

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